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the new roots. The pseudobulb of an orchid proved able to regenerate roots and a shoot from the base, and in a conifer the apparent 'restoration' of a single root on the seedling and in an older stem-part was described. Of eighty-two species of leaves used in experimentation only two new ones were found which produced a shoot, though the large majority formed roots. Modified leaves of various types, phyllodes and bulb-scales, were also found to be able to root. Regeneration was likewise reported in the inflorescence of *Dudleya californica* and *Ruellia rosea*, in the fruits of *Phaseolus vulgaris* and *P. lunatus*, and finally in the 'head' of the alga *Penicillus capitatus*.

An extended discussion followed.

Owing to the lateness of the hour, Dr. Rusby did not present his paper on 'Field Observations of the Past Year,' but exhibited a few interesting plants collected at Oscoda, Mich.

Dr. Southwick exhibited several interesting specimens of the seeds of *Ricinus*.

C. STUART GAGER,  
Secretary

#### DISCUSSION AND CORRESPONDENCE

##### THE ANTHROPOLOGICAL EXHIBITS AT THE AMERICAN MUSEUM OF NATURAL HISTORY

TO THE EDITOR OF SCIENCE: The March number of the *American Museum Journal* contains a brief description of 'A New Eskimo Exhibit.' In the first paragraph of this article is found the following: "the American Museum stands preeminent among all institutions along the lines of ethnological research amid Arctic peoples. The completeness of the material and data thus assembled has enabled the Museum to install a series of groups and cases which illustrate vividly the home and village life of the Central Eskimo, together with their utensils, implements and weapons and the methods of using them." Those who are familiar with the historical development of the department of anthropology of this institution realize the significance of this article. It seems to point to a change in policy which is so far-reaching and of such importance to all American anthropologists as to deserve consideration. I propose to consider, there-

fore, the question whether the old point of view is so entirely wrong and the new point of view is so entirely right as to warrant this change which blots out of existence the results of many years' work.

The activity of the department of anthropology in the American Museum of Natural History became very great ten or twelve years ago and continued with increasing strength until about two years ago, at which time there seems to have been a change in the administration. During the ten years above referred to, we find a systematic attempt on the part of those in charge to carry on investigations over an ever-increasing large area as fast as means would permit. As a result of this intelligently directed series of field operations there grew up in the American Museum one of the greatest departments of anthropology to be found in any museum in the world. The plan of exhibition was on the broadest and most liberal scale. One could for the first time in an American museum study in detail the essential and salient features of the culture of a very large number of tribes, especially those of North America and northeastern Asia; and it seemed it was only a question of time and the continuance of the same policy when all cultures, exclusive of that of Europe, would be found adequately represented. It seems doubtful if any institution ever acquired in the same period of time collections of such magnitude or ever accumulated material with such intelligence or exhibited it in an equally sound manner. Here one could really study the culture of tribes, one could study conditions as they exist; one felt that one was not looking at the illustrations of some elementary text-book, but that he had in front of him the data from which the history of the material culture of mankind might be written. One felt instantly in the halls of the department the spirit of investigation and it was everywhere apparent that this was prompted by the desire to advance science and not by the desire to find material which would fit into or harmonize with some ideal scheme of exhibition. One instinctively felt in the presence of these exhibits that one was in close contact with actual conditions and that one

was studying people at close hand, for everywhere was present the evidence of intelligent direction. It was evident that the objects on exhibition were neither placed there with the idea of their beauty nor was their arrangement such as to present primarily a beautiful picture, but rather one felt that as one passed from the exhibit of one tribe to that of another that the dominating features of each culture were so presented that they were apparent, and of course this was due to the fact that the work of collecting and exhibiting had been performed in an intelligent manner. The collections revealed so far as possible the influence of environment both geographical and historical as the culture of one tribe upon that of another. This great series of exhibits properly excited the admiration of anthropologists both at home and abroad, and the wonderful growth of the department in such a short time deserved the admiration of all who were engaged in the study of anthropology.

It seems, however, that the point of view in the installation of this great mass of material was wrong, for on visiting the museum to-day one finds the condition so different from that which prevailed two or three years ago that one necessarily infers that the old point of view is no longer held. It seems, furthermore, that the present condition may be regarded as a visible manifestation of this complete change in policy. The first evidence of a change in the point of view became manifest when the great gallery containing the archaeological collection from South America was thrown open to the public. The character of the scheme of installation of this collection was so singular that one felt that possibly an experiment was being tried and that the arrangement of the material might be only temporary and consequently a judgment of the merits of the scheme did not at the time seem justifiable. Since this gallery was thrown open to the public, however, the suspicion has become a conviction that the former ideals have been abandoned and new ones substituted. Thus it now appears that a great part of the ethnological collections are to be removed from exhibition and placed in storage, where, it is said, they will be available for

students, and that in their stead will be placed on exhibition a series of type or standard or unit exhibits illustrating certain phases and areas of culture. Two such exhibits are fairly complete and are open to public inspection, namely, the Eskimo and the plains. We have then, on the one hand, the fact that the former scheme of installation has been abandoned, that by far the larger part of the material which was formerly exhibited in the halls devoted to ethnology has been or is soon to be removed and placed in storage, and on the other hand, we have in place of the old series of actual exhibits, certain systematic exhibits of which the Peruvian, the Eskimo and the plains, which are at present installed, may be regarded as typical.

First a word concerning the storage of material. Unquestionably in every institution occasions arise when it becomes necessary to withdraw from public exhibition for a longer or shorter period of time large collections. However necessary this may be, I am convinced that collections, especially those of ethnology, which are forced into retirement always suffer. There is not only the inevitable deterioration which always follows when ethnological specimens are packed away and which is always to be considered, but there is especially that loss of personal interest in such collections which can never be completely restored. The argument that such collections are always available for study is on the whole specious. As a matter of fact, at any rate in anthropology, these collections are rarely demanded for study. The reason for this is, of course, that one does not know what exists in the storage rooms; nor can a catalogue of storage material ever be of such a nature as to make such collections of any great value. When one visits a public institution like the American Museum, which from its size, wealth and position may be supposed to occupy a commanding position in American science, it is not for the purpose of finding what they have in storage but to see what they have on exhibition and to take advantage of the information which may be thus obtained. The student who desires to examine this material, having ascertained that it exists in the museum,

might be reconciled to the idea of storage of the bulk of the collections if they were in glass cases, easily accessible, but it is quite impossible to reconcile the idea of study collections with the character of the storage cases which at the present time are to be found in this institution, for these storage cases are of the flimsiest material, from which it would seem impossible to exclude insects and dust and which apparently might be very easily destroyed by fire. The reasons why stored collections in ethnology lose their vital interest and deteriorate from every point of view and especially fail in the purpose for which they were made are so obvious that it does not seem necessary to dwell longer on the subject.

Of the three collections above referred to, which represent the new ideals of installation in this museum, namely, the Peruvian, Eskimo and the plains, it may be noted first that while they all have certain elements in common they are not consistent one with another, for it seems that in the two ethnological exhibits it was the intention that no duplicate specimens should be shown, whereas in the Peruvian exhibit there is endless duplication. If the Peruvian exhibit is to conform to the other two it should be reduced to one tenth its present size. It is possible, however, that this is contemplated. As this exhibit even in other respects differs from the two ethnological exhibits it may be considered independently of them. Its essential defect is the fact that nowhere in the hall is emphasized the salient features of the culture of the Peruvians, namely, that they were a sessile, agricultural people, living in permanent habitations, possessing domestic animals. On the other hand, we are introduced to such categories as 'objects in stone,' 'objects in wood,' 'objects in bone,' etc., and this fortuitous principle of classification, of course, makes it exceedingly difficult for the student to obtain any idea of the true character of Peruvian culture. It would seem that in installing this collection an ideal scheme was held in mind, that the exhibition cases were conceived of as containing compartments, and each compartment received in advance its label, and that then the attempt was made to find specimens to fit the compart-

ments. Where this was not possible the compartment was left vacant. The absurdity of this ideal scheme of installation, if carried to a logical conclusion, can be easily imagined. It only remains to add that the scientific interest of a great and valuable collection has been almost entirely lost.

An equally absurd phase of this kind of installation is seen in the rearrangement of one section of the Chinese hall, where bronzes have been assembled in certain cases and arranged chronologically, centuries and epochs not represented in the collection being indicated by empty shelves. That these handsome dark bronzes have been placed on the darkest side of the hall is, of course, a minor detail.

Upon examining the Eskimo and plains exhibit it seems that a similar ideal scheme was conceived of and that the great collections which existed in the museum from these two regions were searched to find specimens to fill in the pockets of this scheme. The two collections differ in many ways in detail and must be considered separately. The Eskimo exhibit as it stands conceives the Eskimo as a unit and makes such differences in culture as exist, for example, between that of the Greenland and that of the Alaskan of very secondary importance. The very fact of any difference existing between the Eskimo of the east and of the west is practically lost sight of in the exhibit, and thus also is lost the opportunity to illustrate the influence of the contact of one culture upon another. Of course, if the culture of the Eskimo is a unit, it is quite unessential that one should know what tribe or tribes lie to the south of them or how they have been influenced by these tribes. It may be pointed out next that apart from this defect the collection gives an impression of the Eskimo which is false and misleading. Prominently displayed in the center of the exhibit is an Eskimo woman fishing in the ice. Owing to its position it might be taken as representing a typical phase of Eskimo culture. Thus a false impression is conveyed, as the Eskimo are not essentially fishers but hunters of sea mammals. Taking the fisherwoman on her own merits, however, the details of the group are misleading, to say

nothing of the fact that men rather than women engage in such pursuits. Of nearly equal importance, owing to its position, is a house scene, bad in detail and misleading. The scene represents a woman by a lamp, the source of light and heat in an Eskimo house, completely clad in winter furs. Near her is a baby sprawling on the floor, also clad in furs. Both figures, of course, should be practically nude. The house is constructed after the manner of a temporary habitation, which is never lined. This house is lined. If the woman and child are properly costumed then the house must be regarded as a temporary structure, in which case its lining is entirely inappropriate. The assemblage of objects about the woman is also misleading and has been made without regard for actual conditions. Thus lying on the floor near the woman, who is cooking, is a man's knife, which is entirely inappropriate, and near by is a little toy kettle, which is, of course, entirely out of place.

And so it would be possible to continue in detail an examination of this entire exhibit. Two or three other points, however, seem worthy of notice. In another case are two figures, one of a woman sewing, the other a man cutting a skin. According to the label the woman is dressed in clothing from Cumberland Sound, while her hair is dressed after the Labrador fashion. She is supposed to be talking to the man who is dressed in a costume from the west coast of Hudson Bay—a truly intertribal gathering. According to the label, the man is cutting a thong from seal skin, the label stating that it is taken from fresh seal skin. In the group, however, the man has a nicely tanned piece of common skin, which is never used for lines. The posture of the man is not only wrong, but absolutely impossible.

The case devoted to the decorative art of the Eskimo is perhaps the weakest and most trivial of the whole exhibit. The motive which determined the selection of the objects is not at all clear. Many of the specimens are such as are made for trade and possess little or no ethnological interest. Among the highly decorated objects of the Eskimo are the

bone and ivory pipes of the Alaskan Eskimo. None of these are to be found in the case. There are, to be sure, several pipes in the case, but none are typical of the Eskimo, but rather of the Algonkin tribes of the south. To introduce Peary's pack sledges in an exhibition of this sort does not add to its ethnological value. To characterize this exhibit as a whole, I think the word trivial does it justice. If instead of the great collection formerly on exhibit in which one could study in detail the Eskimo from the eastern to the westernmost division we are to have a single exhibit of this nature it should be accurate at least, so far as the character of such an exhibit will allow.

The plains exhibit is perhaps on the whole less fortunate than that of the Eskimo. While the defects here are equally grave they are not so apparent. The most serious objection to this exhibit is probably the fact that the objects used in making the exhibit have been drawn from two or three tribes, especially the Blackfoot, Sioux and Arapaho, which, while they may be regarded as typical of a certain region of the plains, represent only one phase of the culture which actually exists upon the plains. These tribes as they existed in recent times are non-agricultural, buffalo-hunting, tipi-dwellers. No objection could have been made to an exhibit representing this phase of the life of the plains, but to single out the predominating features of such tribes as these is entirely to misrepresent the plains conditions. To consider a single fact, the habitations of the plains are shown by a full-sized tipi and several tiny models. Thus the inference may be drawn that no other kind of habitation prevailed in this region, whereas many other kinds of habitations were found, such, for example, as the earth lodges of the Mandan, Arikara, Omaha, Pawnee and Tonkawa, the grass lodges of the Wichita and Caddo, not to mention other types of dwellings of other tribes. Of the existence of many kinds of wind breaks, shelters, arbors, etc., no one would suspect. The life of the plains is represented as that of hunters, especially of the buffalo. One looks in vain for facts representing the sessile agricultural populations on the plains. This was once the occupation of all the tribes

just enumerated and it was undoubtedly that of the other tribes until within a comparatively recent period. Turning to the exhibit itself, it seriously fails as a whole to represent adequately the wealth of the house life on the plains. To judge of this failure by a single example, the miniature tipi, thrown open so as to permit a view of its interior, may be taken. The model seems entirely inadequate and appears rather as an interesting toy. Its interior arrangement does not conform to that of the Indian tipi; the beds are represented as on the ground; the leanbacks are not in pairs, and it is equally at fault in other details. The little model consisting of two men, presumably hunters or warriors, for their bows, arrows and shields are near-by, is even more misleading. The group is either intended to represent men preparing a hasty meal while on the hunt, in which case they would not, ordinarily, boil their meat by hot stones in skin vessels, or it represents a process of cooking, in which case it would not be done by men, but by women. The section devoted to the subject of transportation presents some curious features. In the section of the human burden-bearer there is exhibited a pair of moccasins, which, by the way, are a specialized type worn only in winter by certain tribes, several cradleboards typical of no one tribe or group of tribes, while at the top of the section is a poor specimen of a packing strap badly shown.

This plains exhibit, even more than that of the Eskimo, is inconsistent. Whereas the first section of this idealized exhibit treats the plains as a unit, in the latter sections tribal elements appear, thus introducing an amount of detail which, however valuable it may be for scientific purposes, seems out of keeping with the idea of the exhibit. I refer especially to the exhibit illustrating the warrior orders of the Arapaho and Blackfeet. Of course, it would have been possible to have maintained a logical and consistent point of view throughout this exhibit, in which case these specialized exhibits would not appear, but in their stead would be found a general treatment of the religious and social life. No such attempt, however, has been made.

Throughout this exhibit, as in the Eskimo

exhibit, is everywhere manifest the result of the conscious effort to make the cases look pretty, to have the object on one's right balance in size with that on one's left, quite regardless of whether it illustrates anything or not. After all, the chief defect of this exhibit of the plains is that, in attempting to illustrate an idealized culture, it not only fails to recognize the actual conditions which exist in that culture, it not only makes it impossible to study these conditions and the reasons therefor, but it assumes that all peoples within this area had a common culture. To illustrate this by a single observation—when a buckskin shirt is shown as the costume of a man the casual visitor would assume that all the men wore buckskin shirts, presumably of this pattern, whereas many Indians on the plains wore no shirts at all. The labels here, as in the Eskimo exhibit, are prolific in number, but generally of a trivial kind, conveying information of a kindergarten nature.

Such exhibits as those above characterized might with some degree of propriety be found in the lower grades of the public school, but they certainly do not seem worthy of an institution which claims to be foremost among American museums. If exhibits of this nature are advisable, it would seem that there is no reason for the concentration under one roof of large collections. If the purpose of the general public is to be served by such exhibits it would seem desirable that the great bulk of the collections which are now being stored should be distributed among some ten or twenty of the high schools of the city, for thus the ideal of this scheme might the more easily and cheaply be realized. Or, again, this type of installation might very well be adopted in a small institution with extremely limited resources, or it might even be adopted for a single one of the great halls of the American Museum; indeed, it is conceivable that one of the halls, such as the north hall of the main floor, might very appropriately, in this institution, be given up to an exhibit, in the briefest and most concise manner possible, which would attempt to represent the great general areas of culture which exist among the different peoples of the earth. Such a hall

would indeed be of great value in a great institution like the American Museum and would amply repay the labor of preparing such an exhibit, for the material for such a hall could easily be selected from the duplicate specimens without making any considerable drain on the exhibit halls proper, which should be devoted to the ethnographic exhibit. But to adopt this as the type and standard of installation for the entire department seems, when one considers the greatness of the collections and the size of the building of this institution, utterly incongruous. In view of the commanding position which this institution holds in America, its example is bound to have a very great influence on all of our public institutions, and one has the right to expect from it work of the highest scientific value, and to expect that through its exhibition halls it shall appeal primarily to the intelligent scientific world.

GEORGE A. DORSEY

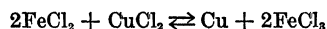
#### THE FORMATION OF LAKE SUPERIOR COPPER

TO THE EDITOR OF SCIENCE: The report of the meeting of the Geological Society of Washington and of the paper from the Geophysical Laboratory of the Carnegie Institution on the artificial production of silver and copper in your number of March 8, 1907, leads me to think I should, in justice, publish extracts from a letter received by me from Dr. G. Fernekcs, of the Houghton College of Mines, left undated, but received some weeks ago. In a paper on the theory of copper deposition (annual for 1903, p. 249, etc.) emphasis was laid on the probable importance of chloride solutions in copper formations. Then when I read of Stokes's work in *Economic Geology* (Vol. I, p. 644) I suggested to Dr. Fernekcs that he extend it to what seemed to me probable conditions of copper formation. He has been engaged in experiments, including an extensive series of tests of mine waters and minerals, along this line, not yet finished, concerning which I will not pretend to report in full, but just quote one extract to show the kind of results he is getting. An apparatus like that of Stokes's was used. Of course the experiment is not precisely the same as the experiment made in the Geo-

physical Laboratory, and there is no direct question of priority involved, but they are closely parallel and entirely independent. It is up to me to say this as a 'mutual friend.'

ALFRED C. LANE

I have therefore again tried the action of  $\text{FeCl}_2$  on  $\text{CuCl}_2$ . When these two salts react on each other in an almost neutral solution, free acid is given off according to the following reaction:



If we constantly neutralize this acid by some alkali such as  $\text{Ca}(\text{OH})_2$ , we can change the above reversible reaction into one which will proceed but in one direction, namely, from left to right as above. On trying this I was pleased to see that every trace of copper was precipitated from the solution and of course calcium chloride was formed as a by-product. I immediately upon this tried calcium silicate as a neutralizing agent, and was delighted in seeing all the copper precipitated. Natural wollastonite was the calcium silicate employed. The by-product in this case was, of course, besides calcium chloride, silica (quartz). The whole thing is now cleared up. That is, three factors were active in bringing about the deposition: copper chloride (or copper silicate and  $\text{HCl}$ ); calcium and sodium silicates, as neutralizing agents; and then minerals with ferrous iron in them.

\* \* \* As to the aluminum: the same happened to it as to the iron. After all the copper was precipitated and the solution was neutral it was thrown out as an extremely basic salt. A trace of chlorine is detectable in most of the minerals around here. How beautifully we will check up with Pumpelly's observations.—The mineral now gone; and the greenstone, etc. \* \* \*

\* \* \* Will send you once more corrected sheet of analyses and further notes as to tests of Cu and Ni thereon.

Yours,

(Signed) G. FERNEKES

#### RADIUM IN BIOLOGICAL RESEARCH

*A Radioactive Microscopic Slide.*—In the course of experiments on the effects of the rays of radium on plants it became desirable to observe directly the reaction of the living protoplast to these rays. For this purpose the principle of Lieber's radium-coating was applied in the preparation of a radioactive